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ABSTRACT

In order to aid teacher and administrators in improving programs in technical education, this report provides a brief review and synthesis of some of the recent research concerning post-high school technical education in the State of Oklahoma. The research is divided into the following topics: history, statewide surveys, placement and employment, cost benefit, technical teachers, administration, program development, and student characteristics. A bibliography of all the research studies covered in this report is appended. (BC)

REPORT OF RESEARCH IN VOCATIONAL TECHNICAL EDUCATION

A REVIEW AND SYNTHESIS

of

TECHNICAL EDUCATION RESEARCH IN OKLAHOMA

by

David Allen Anderson

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VOCATIONAL RESEARCH COORDINATING UNIT

OKLAHOMA STATE UNIVERSITY

Research Report Number 17

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Stillwater, Oklahoma

January 1970

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FORWARD

The administrator's job is difficult at best. He should have access to all of the latest information available that relates to his responsibilities. Without this assistance we cannot hope for a quality educational system.

Research is a way of gaining knowledge, especially in areas that have not yet been mastered by authorities in their field. This knowledge is only as reliable and valid as the design of the research. There must always be continuing effort to improve the quality and quantity of research in order to maintain and add to our storehouse of knowledge.

On the other hand, a wealth of knowledge is worth nothing unless it is put to constructive use. In too many instances, the results of educational research are not presented in useable form to those who are doing the work in the field.

This review of research is directed toward those administrators and teachers at the local level in hope that they can use it to improve programs in technical education. If this is accomplished, the labors of the researcher are not in vain and the feedback loop is completed.

A REVIEW AND SYNTHESIS OF TECHNICAL EDUCATION RESEARCH IN OKLAHOMA

Introduction

The purpose of this paper is to give a brief review and synthesis of some of the recent research conducted in Oklahoma concerning post-high school technical education. The research has been divided under the general topics listed below.

History

Statewide Surveys

Placement and Employment

Cost Benefit

Technical Teachers

Administration

Program Development

Student Characteristics

Each topic will be dealt with separately, but some of the research may contribute to more than one single topic. As each topic is reviewed, the available research that contributes to that general area will be considered

History

There are two studies dealing with the history of technical education in Oklahoma. Robert Freed's study, "The Development of Post-High School Technical-Vocational Education in Oklahoma," deals with the history of technical education from the broad statewide approach.

Mr. Freed found that

> The institutions of higher education in Oklahoma that are governed by the Board of Regents for Oklahoma Agricultural

> and Mechanical Colleges furnish the bulk of the technical-vocational education opportunities in Oklahoma higher education institutions. There is no state coordinating board for all technical-vocational education in Oklahoma. [Some technical programs offered by O.S.U. are not under the supervision of the State Board for Vocational-Technical Education.] Enrollments and graduates in technical-vocational education programs have approximately doubled in the period from 1959 to 1967. There has been increased awareness by the legislature, state administration, industrial people, and researchers of the role of technical-vocational education in the industrial development of Oklahoma.

On the other hand, David Longobardi's study, "Historical Development of the Electronics Technology Curriculum at Oklahoma State University's Technical Institute," is an in-depth study of the historical development of one particular program. Mr. Longobardi states that

> The historical development of the curriculum shows a gradual change from training a specific Radio Technician to a much broader Research and Development Technician. The present graduate is capable of entering industry through a cluster of related occupations rather than a single occupation.

Statewide Surveys

In January 1968, Dr. Maurice Roney and Dr. Paul Braden completed a comprehensive Statewide Survey entitled, "Occupational Education Beyond the High School in Oklahoma." This study brought together information from several sources in order to present a comprehensive look at occupational education beyond the high school in Oklahoma including technical education. The needs for planning, funding, and a system of development were presented. The nature of technical education and national and state trends were also reviewed. The study presents material under the following general headings.

> Trends in Occupational Education Beyond the High School.
>
> The Development of Oklahoma's Present Occupational Education System at the Post-High School Level.

Oklahoma's Present Occupational Programs at the Post-High School Level.

Economics of Education: Cost and Returns to Technical Education.

The Mobility of Technical Program Graduates.

Technician Employment Patterns.

Technician's Employment Practices.

Who is Best Served by Occupational Education Beyond High School.

Recommendations.

Because of the comprehensiveness of this study, it is felt that a review of findings could not be properly presented in the scope of this review.

Material from several of the other studies included in this review of the technical education research is also included in the Statewide Study conducted by Roney and Braden.

Howard Hardt made a statewide study of technical education entitled, "Output of Engineering and Physical Science-Related Technicians from Oklahoma Schools, 1960-67." Hardt presented the following findings and conclusions.

> Verifiable enrollments in Oklahoma technical programs have generally run about one-third to one-half that listed for those programs in several prior reports. This study discusses the probable reason for the inaccuracy of the earlier reports. Oklahoma engineering and physical science-related technical programs do not graduate enough technicians yearly to supply the demand for these persons by Oklahoma industry. The gap between this supply and the demand for these technicians is widening steadily. Tulsa, one of the fastest growing industrial centers in the State, has a considerable need for technicians, yet has no post-high school engineering and physical science-related technician program in its vicinity. Other technical programs are located in areas having no demand for the graduates from such programs.

In the above statement Hardt was pointing out that there was not a technician education program (as defined by the American Society for

Engineering Education) closer to Tulsa than forty miles away in Okmulgee. At the same time, there are some programs being offered in areas of the state where there is very little local demand for technician education graduates. Hardt's study also indicated a lack of communication between training institutions and industry as mentioned in other studies reviewed in this paper. Progress has been made in these areas since Hardt's study.

Dr. Paul Braden has a statewide study in process entitled, "The Design and Implementation of a State Occupational Training Information System (OTIS) Based on the Needs of Oklahoma." The overall purpose of this project is to supply data on which to base decisions to facilitate changes in the State Plan for Vocational Education in Oklahoma as manifested not only in the plan itself but in new patterns of occupational offerings and enrollments based on a systematic and continuous system of detailed occupational training information. These changes should follow the directions set forth in the Vocational Education Amendments of 1968.

This project will combine (a) the gathering, processing, and communications of information required for decision making with (b) the socio-political involvement necessary for implementation. The combining of these two interdependent factors makes this project fairly unique in that most projects of this type are concerned only with methodologies for providing information to decision makers. The problem for this project is to transform the above aspirations into the most relevant training program for Oklahoma; i.e., training programs that will support the economic development of the State and provide maximum job opportunities for trainees. The implementation of the necessary organizational

and operational changes in the existing system must be recognized as a difficult task.

Placement and Employment

There are three rather recent studies dealing with the placement of technician graduates and the employment and job seeking of technician graduates from Oklahoma technician training programs.

Cecil Dugger investigated both placement and employment in his study entitled, "An Analysis of Oklahoma School-Industry Practices in the Placement and Employment of Technician Graduates." Dugger obtained data in eleven schools through a field study using scheduled interviews with administrative and instructional staff personnel. Data on employment practices were obtained through seven employer conferences representing fifty-seven Oklahoma employing organizations.

> Differences were found in several variables related to placement practices of schools graduating technicians, such as number of graduating technicians, total enrollment of school, type of educational institution, and geographic location of school. Similarly, differences were found between employment practices or organizations, such as number of technicians, total number of employees, major activity, and geographic location of employers. A statistically significant difference was also found to exist between total number of employees and primary source of technicians; employer preference for technicians and major activity; reasons for giving preference to technicians and major activity; and geographic location of employer and type of technician used to fill technical positions. The overall conclusion from this study was that several variables tend to affect school-industry practices in the placement and employment of technician graduates.

The following is a brief review of the findings as indicated by Dugger.

1. The placement resources tended to be more adequate as the number of graduating technicians increased. When the number of graduates was greater than 16 the schools tended to feel

that their placement resources were adequate. The on-campus interview was considered the most important means of disseminating placement/employment information.

2. Technician placement became more of a primary function of the total guidance program as the total enrollment of the schools increased beyond about 700.
3. Technician placement was a primary function of the total guidance program in trade-technical schools, technical institutes, and universities. In junior colleges, it was primarily the responsibility of students and/or other organizations.
4. Schools located furtherest from a Standard Metropolitan Statistical Area (SMSA) used results of "state surveys and/or state studies" while schools located closer or within an SMSA were more likely to utilize "employer lists of job openings" as a source of information on job openings.
5. Organizations employing large and small numbers of technicians were more likely to provide well-defined paths for technician advancement than organizations employing from 10 to 19 technicians. Also, the larger the number of technicians employed by an organization, the more likely they were to hire technician graduates without military experience.
6. The greater the number of employees the greater the number of employment sources organizations used to fill technical positions. Also as the number of employees decreased the frequency or organizations "upgrading employed personnel" increased and other employment sources were used less frequently to fill semi-professional technical positions.

7. Manufacturing, public utilities, and government did not actively recruit graduating technicians, while petroleum organizations appeared to have recruited technician graduates actively.
8. Employers within a SMSA were more apt to fill technical positions with experienced technicians.
9. For the years 1968-1972, there was an estimated demand for 1,114 drafting and design graduates, followed by 988 electronics, and 767 mechanical. This information came from 57 Oklahoma organizations representing 60 percent of the total demand.

Lloyd Briggs conducted a study to determine the extent of graduate placement and the occupational achievements of students, both graduates and non-graduates, who were actively enrolled in post-high school electronics technology curricula in Oklahoma. The study, entitled "A Study of the Placement of Graduates from Oklahoma's Post-High School Programs of Electronics Technology," was limited to six of Oklahoma's ten tax supported, post-high school programs of electronics technology.

Some of the findings of Briggs' study are given below.

1. There tend to be more veterans of military service in the certificate of completion programs than there are in associate degree programs.
2. Students entering the associate degree program generally tend to have more previous college credit than those entering certificate of completion programs.
3. The majority of the previous college work of students in technician education programs is in the field of engineering.
4. Job placement at the time of graduation is higher for associate degree graduates (88 per cent) than for the certificate of completion graduates (65 per cent).

5. The majority (approximately 62 per cent) of graduates from both types of programs enter occupations for which they are educated or a related occupation.

7. About 76 per cent of the graduates from both programs accept jobs in Oklahoma.

8. After graduation 47 per cent of the associate degree graduates and 21 per cent of the certificate of completion graduates persued continued education.

9. The median annual starting salary has increased by $500 for both groups of technicians since 1959 ($4,750 in 1959, and $5,250 for 1964).

10. For the last three years, starting salaries for Oklahoma educated electronics technicians have been above the national average.

Wilford Bates conducted a study dealing with employment of technical students which is reviewed in the student characteristic section.

Cost Benefit

In the spring of 1968, Robert Dupree whose major field is economics, completed a cost benefit study entitled, "A Cost Benefit Study of Post-High School Technical Education in Oklahoma." Mr. Dupree gathered rather detailed data with respect to student costs, and costs to society at eight different institutions in Oklahoma. The results of this data are compared with the returns to both the individual and society as a result of technical education.

According to Mr. Dupree,

> The findings suggest under investment in technical education relative to other areas of higher education. While the rate of return to higher education in general has been

> established at about nine per cent, an estimate of about 35 per cent to the individual and about 25 per cent to society appears to exist in technical education in Oklahoma. Net increased earnings to the student in technical education equal the costs of education to the student after approximately three and one-fourth years of employment, and the costs of technical education to society are met in approximately four years. The starting salaries received by technical graduates exceed, in many instances, those realized by persons with baccalaureate degrees. The relative underinvestment in this area suggests that the importance of technical education in Oklahoma's economic growth is not fully understood.

Technical Teachers

Some role perceptions of Oklahoma Technical Teachers were studied in 1967. Marvin Wittrock made a study entitled, "The Role Perceptions of Oklahoma Technical Teachers Toward Minimum Professional Standards."

Mr. Wittrock measured the attitudes of technical teaching personnel and department heads of technical curriculums in the state of Oklahoma. The attitudes of this population were measured by considering the following background characteristics: age, teaching experience, industrial experience, degree, socio-economic background, type of institution, and completion of technical education course work.

In conclusion, Mr. Wittrock stated

> The findings of this study indicate the importance of selecting personnel who possess favorable attitudes when staffing technical programs. From the data, it was evident that technical teachers in Oklahoma feel the need for establishment of minimum professional standards. Since professional technical education course work was the greatest influence on technical teacher attitudes, rigid requirements should be established to insure completion of this type of course work. Since industrial experience also had a marked influence on technical teacher attitudes, a program of continued industrial experience should be established for technical teachers.

Another study that deals with the roles of technical teachers was conducted by Solomon Satkes, et.al., and entitled, "An Exploratory Analysis of the Roles and Role Conflicts of Vocational Teachers in

Oklahoma." Because of the nature and scope of this study, the results will not be summarized to keep them from being taken out of context. For further information on this and any other studies reviewed within this paper, it is suggested that the reader obtain a copy of the study.

Dr. Paul Braden is working on a project that deals with both technical teachers and program development. Dr. Braden had a proposal funded to develop a teacher training program to train electro-mechanical technology teachers. The project entitled, "Development and Evaluation of a Teacher Education Program in Electro-Mechanical Technology," was started June 1, 1969, and will end July 31, 1970. Two subsequent fundings may be approved to run through January 1972. "The objective of this proposal is to supply E-M teachers for junior colleges, technical institutes, and other relevant institutions and to establish a model program for similar emerging technical fields...."

Administration

A study by Dr. Scott Tuxhorn, entitled "The Educational Unit for Administration, Organization, and Supervision of Area Vocational-Technical Schools in Oklahoma," is broader in scope than the title may indicate. Information was gathered from forty-two states to determine specific patterns for the administration, organization, and supervision of area vocational-technical schools. Also, this study is broader than the scope of this report since the area vocational-technical schools offer programs for both secondary and post-secondary students. Because of the nature of the area schools, there was some question as to the state level of authority; the constitutions and statutes of several states were reviewed to determine how the area schools were organized and the state agency which controlled them. In addition, an opinionnaire survey was

made of sample leaders regarding the administration, organization, and supervision of area vocational-technical schools. Dr. Tuxhorn indicated the following findings in his report.

> The States' practices in the administration, organization, and supervision of area vocational-technical schools are varied. There are few uniform methods of control or basis by which this control developed. The financial support also varies, but there are certain general trends, both for construction and operation, which exist in several states. Oklahoma, however, is unique in not supplying State funds for the area schools.
>
> Literature, along with the opinionnaire, brought out the fact that post-high school education, regardless of the college grade or the nature of the program, is higher education. Since area vocational-technical schools operate at the post-high school level, an agency of higher education should have a voice in policy making as well as in the administration, organization and supervision of these schools.
>
> There is considerable support for the post-secondary technical programs to be offered in a comprehensive two-year institution because of status of the name "college". One interesting conclusion of the study is that the technical institute is rated as the best school for training technicians, but the technical students are going to community colleges in increasing numbers due to factors other than that of acquiring technical competence.
>
> There are trends noted in the study indicating cooperation between agencies of higher education and vocational-technical education is essential for good area vocational-technical school programs at the post-secondary level.

Program Development

In 1965, Dr. Maurice Roney submitted a proposal through the Research Foundation, Oklahoma State University, to study a new and emerging technical occupation. The study, entitled "A Research and Development Project in an Emerging Occupational Field - Electro-Mechanical Technology," began September 1, 1965 and ended August 31, 1966. The specific objectives of the research and development proposed for this project were (1) to identify the skill and knowledge requirements of technical

occupations that involve elements of both electrical and mechanical technologies and (2) to develop a planning guide for technology curricula in electro-mechanical technology.

Objective I of the research project was a nationwide field study of electro-mechanical technicians with a concentration on the unique educational requirements of these occupations. These results provided dramatic evidence of the need for broader training for electro-mechanical technicians. As a part of this project the functions and other characteristics of electro-mechanical technicians were identified.

The second objective of this research project was concerned with the preliminary design of a post-high school educational program to prepare individuals capable of filling the unique requirements of a broad spectrum of employers for electro-mechanical technicians which were identified in the first objective.

In 1967 a proposal was submitted by the Technical Education Research Center, Inc., requesting funds to continue this project. This phase, which is now is progress, is to carry out the first 33 months of the research program planned to further develop and document the instructional plan proposed for the curriculum in Electro-Mechanical Technology in cooperation with three pilot schools. One of the pilot schools is at Oklahoma State University.

The objectives of the next phase of this project will be to further test, evaluate, and refine the curriculum materials developed within the orginal pilot schools and also within a larger group of experimental schools. At this time, however, Oklahoma State University is conducting the only pilot school.

Student Characteristics

There are several studies that deal in some way with the student and his relationship to technical education. Studies under the general heading of "student characteristics" can be quite diverse with respect to the specific student characteristic being investigated. In order to try to fit these studies together into the whole picture, they were placed on a student progress continuum. This identifies where the population being studied was with respect to education level at the time the study was conducted. The studies were also further divided into groups depending on whether the main emphasis of the study was toward characteristics that were academic, academic and socio-economic, socio-economic, and other characteristics which were put under the heading of "behavior." (For example, see Figure 1.)

The Oklahoma Research Coordinating Unit studied a population while they were in high school and Mr. Yeager conducted a follow-up study of a portion of the same population after they completed high school. This chart allows not only an overview of the research that has been completed but also indicates areas that have had little or no study. The most obvious of the latter is the lack of studies with respect to technical education graduates.

Academic Characteristics

Donald W. Brown conducted a study entitled "The Relationship of Academic Success of Students Enrolled in the Oklahoma State University Technical Institute to Reading Ability and Mechanical Ability" to obtain evidence that could be used in predicting success of the students. The prediction was to be based on measurements of their

STUDIES OF TECHNICAL STUDENTS

HIGH SCHOOL

VOCATIONAL-TECHNICAL EDUCATION

JOBS

Donald W. Brown

Terry P. Spradley

Aaron J. Miller

Donald S. Phillips

Oklahoma Research Coordinating Unit

Gordon E. Von Stroh

Dewey A. Yeager

Marsena M. Norris

James L. Harris

Wilford M. Bates

Characteristics

Academic and Socio-Economic

Academic

Socio-Economic

Behavior

mechanical aptitude and their reading ability. Additional information which might also be used in predicting success of these students includes measurements of abilities in English, mathematics, social studies and natural sciences which are determined from results of scores on the American College Testing Program (ACT) test.

Brown considered a grade average of 2.0 at the end of the first year as being the minimum to be successful. Of the seventy students studied, twenty-nine were found to be successful (grade average of 2.0 or better) and forty-one were considered unsuccessful (grade average of 1.99 or less).

The results showed the following to be predictors of success.

1. Reading vocabulary and reading comprehension either singularly or combined.
2. Mechanical reasoning by itself - spatial relations had a nullifying effect when combined with mechanical reasoning.
3. Results of English (ACT) test.
4. Results of natural science (ACT) test.
5. Results of mathematics (ACT) test (negative correlation was found with respect to grade point average).
6. The composite of the ACT test resulted in the highest correlation with grade point average.

Terry Spradley conducted a research project to determine whether or not the existing information that is available for all entering college freshmen in Oklahoma, the American College Test (ACT) scores and the level of mathematics completed prior to enrollment in the program could be used as predictors of success in Business Data Processing.

Spradley's project, entitled "The Relationship of Academic Success of Students enrolled in Business Data Processing at Three Oklahoma Junior

Colleges to American College Test Scores (ACT) and Level of Mathematics," listed the two conclusions given below.

1. The correlation between all predictor variables and the criterion proved to be significant at the one per cent level indicating that ACT and math level can act as significant predictors for success in business data processing.

2. Minimum ACT scores for success in business data processing can be predicted from regression analysis. The results of the regression equation analysis indicated that potential students should have minimum ACT scores of English, 15; mathematics, 14; social science, 16; natural science, 16; composite, 17; and have some mathematics beyond Algebra II in order to expect success in business data processing as indicated by a 2.0 (C) grade point average or better.

Academic and Socio-Economic Characteristics

In an effort to identify characterization of the entering technician education students at post-high school institutions in Oklahoma, Donald S. Phillips conducted a study entitled "Personal and Social Background Characteristics of Entering Technician Students at Four Post-High School Institutions." This study was limited to students enrolled for the first semester of the 1967-68 school year. Other criteria for program participation are given below.

a. All programs offered by the two technical institutes operated by a state university.

b. Programs at a state supported junior college which receive financial reimbursement from the Technical Education Division of the State Department of Vocational-Technical Education.

c. Programs at a vocational technical school which receive financial reimbursement from the Technical Education Division of the State Department of Vocational-Technical Education.

In brief, Phillips reported these findings.

1. Technician education students entering different types of institutions differ on a number of personal and social

backgr·d characteristics. Differences among the four groups were found on 15 of the 22 variables.

2. According to selected socio-economic background factors, junior college students and students attending the two technical institutes were similar but the vocational-technical school students tend to come from lower socio-economic backgrounds.
3. On the basis of six standardized test scores used for a measure of scholastic aptitude, the students at the two technical institutes were similar and higher than the other two groups. The vocational-technical group tended to be lower than the junior college group.

The study also revealed that technician students do not know and make choices among the available technician education programs in the state. Also, they tend to express unrealistic expectations about completing high levels of education.

Another finding was that, in general, the state's high school guidance systems do not effectively serve prospective technician education students. Finally, Phillips found that the reading skills of technician education students tend to be lower than norms for grade thirteen students.

In order to better understand the engineering technician students and dropout, Aaron Miller conducted a study entitled "A Study of Engineering and Technical Institute Freshman Enrollees and Dropouts in Terms of Selected Intellective and Non-intellective Factors." The purpose of this study was to determine the relationship of certain intellective and non-intellective factors with successful completion of the freshman year of study in a four-year professional engineering

program compared with a two-year technical institute program at Oklahoma State University.

In conclusion Miller made the following statements.

> ...it would appear that factors relating to social class background relate to program choice; specifically, the decision whether to enroll in an engineering or a technician institute program. It would further appear that factors related to success or failure in either program are independent of socio-economic background. The lack of a significant difference between dropouts and non-dropouts on the dimension of social class background would seem to underscore the statistical significance of the non-intellective personality dimensions on which the two groups significantly differ. Non-intellective personality variables did not seem to discriminate with regard to program choice, but these personality variables do discriminate relative to success or failure once the choice is made.

Socio-Economic Characteristics

The study conducted by the Oklahoma Vocational Research Coordinating Unit did not deal directly with technical education but was rather background data and aspirations information on all high school seniors.

An instrument of about sixty items ranging from family background, family education and status, to plans, desires and interests of the student, was administered to the 34,580 high school seniors in the spring of 1967. There were 29,798 usable returns or 86 per cent. The purpose of this study was to look at the background, plans, interests, and desires of these young people on a statewide basis that could be grouped or sorted as desired. The data gathered in this study would be excellent base data for a variety of continuation or followup studies.

Gordon Von Stroh (University of Oklahoma), realizing a general lack of knowledge and information on the personal, social, academic, and economic characteristics of post-secondary vocational-technical

education graduates and dropouts, conducted a study entitled "A Socio-Economic Study of Vocational-Technical Education Students." This project studies the students of Oklahoma State Tech (the Oklahoma State University School of Technical Training at Okmulgee, Oklahoma).

In brief, the student and graduate population of Oklahoma State Tech has the following characteristics.

1. There is a higher proportion of male students than the state average for other institutions.
2. There is a higher proportion of Indians and Negroes than the state average for other institutions.
3. The mean age of graduates is higher than the mean age of vocational-technical education students nationally.
4. A larger portion of students are married than at other institutions in the state.
5. About the same percentages of students are from outside of Oklahoma as state averages.
6. The students' rural or urban backgrounds do not relate to the dropout rate.
7. With both graduates and dropouts, there were relatively fewer parents with white-collar jobs and relatively more with blue-collar jobs than in Oklahoma's or the national labor force.
8. Parental income was considerably lower than for other institutions in the state.
9. A higher per cent of men than women had jobs upon graduation.
10. Fifty-eight per cent of the graduates would prefer to stay in Oklahoma and sixty-six per cent indicated that their chances for employment were better outside of Oklahoma.

11. Seven and two tenths per cent of graduates were unemployed at the time of the study.

12. There seems to be no relationship between geographic origin and the ability of the student to obtain a job.

13. Of the job positions filled by the graduates, 37 per cent were out-of-state and 63 per cent were in Oklahoma, but 87.1 per cent of the graduates were from Oklahoma and 12.9 per cent were from out-of-state. Rural or urban background was not significant.

14. For the graduates who had jobs at graduation, 51.1 per cent were found through the school, 15.2 per cent through state employment service, 13 per cent through friends and relatives, and 12 per cent by applying directly.

15. About 90 per cent were in jobs which used the training they received at Oklahoma State Tech, about 30 per cent said that their training was insufficient and two-thirds said the training should have been longer. Sixty-nine per cent were satisfied with their jobs.

16. One-half of the graduates were employed as craftsmen, foremen, or kindred workers.

17. Men graduates received an average of $419.08 per month and women only $251.56 per month.

18. Graduates employed out-of-state received considerably higher incomes than those employed in Oklahoma.

19. Interest was by far the most important reason given by graduates for their training in their field.

Since the main thrust of Von Stroh's study was toward socio-economic characteristics of the technical students, his study was reviewed in this section, but he included academic characteristics briefly as they related to the socio-economic characteristics.

Wilford Bates, who conducted a study entitled "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma," wanted to ascertain which of selected variables tended to affect interstate mobility among recent technician graduates of the associate degree programs in Oklahoma. The variables he chose were grouped as follows: (1) Personal and socio-economic background, (2) attitude toward Oklahoma in general, (3) attitude toward selected variables related to employment, (4) selected employment practices of employers from Oklahoma and out of state, (5) economic aspirations, and (6) personal, social or economic reasons given for remaining within Oklahoma or for leaving the state.

The personal and socio-economic background characteristics of those technician graduates who left the state, with respect to those who stayed in the state, had a tendency to be younger, married, from upper or middle socio-economic class, raised in an urban setting, and a graduate of a technical institute rather than a junior college. With respect to their attitude toward Oklahoma in general, the graduates who left the state felt their future would be better out of state and have some negative attitude toward Oklahoma. The graduates leaving the state tend to prefer employers of a thousand or more employees, emphasize the economic aspect of the job rather than personal-social factors, and indicate a willingness to stay in Oklahoma for a better job. A large per

per cent of these graduates that left the state expect a salary of at least $10,000 per annum in five years or less. They emphasized "better salaries," "community atmosphere," and "greater opportunity for success and advancement" as important reasons for leaving the state. These state leaving graduates also receive more recruitment literature from out of state.

It appears that Oklahoma employers are not competing with out of state employers in their recruiting efforts.

James Harris made a study of high school technical program graduates and their continued education. Harris's study entitled "An Analysis of Oklahoma City High School Technical Graduates as Related to Subsequent Higher Educational Patterns" attempts to answer the question, "what is the relationship between selected background factors of pre-technical students and their subsequent educational patterns?"

Harris was unable t establish any criteria to measure potential student success because of an unexpected low dropout rate from two year programs in the sample selected. However, he had this to say.

> Of the seven characteristics which were examined relative to association with selection of two year post-high school technical programs, five were found to be insignificant. The two characteristics which could be significantly associated with program choice were parent's income and number of high school math and science courses.

The five student characteristics which were rejected as indicators of two year technical program performance include (1) student work experience as indicated by student's personal income, (2) father's occupation, (3) father's education, (4) high school grade average and (5) social participation.

Characteristics accepted as significant indicators of two year technical program performance were high school math and science background and parent's income. The fewer the number of math and science

courses taken in high school, the greater the probability of two year technical program selection. The data also indicates that preference of two-year technical programs over four year related programs is influenced by money available to finance education.

Harris includes the two unexpected findings given below in his study.

> Possibly the two most important findings of this paper were unexpected. The percentage of students entering post-high school education from the Oklahoma City high school technical programs was 23% higher than the Oklahoma average from all high school programs (65% versus 88%). Also, the percentage of dropouts from two year technical programs among the Oklahoma City high school technical program graduates was 20% lower than the Oklahoma average two year technical program dropout rate (25% versus 4% for the first year).

Marsena Norris conducted a study entitled "Selected Behavioral Changes of Students Attending the Southern Oklahoma Area Vocational-Technical Center during 1966-67" to ascertain the effect of attending the area vocational-technical center on the behavior at his local high school.

According to Norris area center students have certain characteristics.

> Results of this study strongly indicate that area center students are inclined to be more cooperative, make better use of their time in class, and exhibit better discipline in their home high schools while participating in area center programs. The study also indicates that academic achievement was not enhanced while attending the area vocational-technical center. It was also found that area center students tend to spend less time at their home high school participating in extracurricular activities.

Mr. Dewey Yeager used the data gathered from high school seniors by the Research Coordinating Unit to conduct a follow-up study entitled "A Study of Oklahoma High School Seniors Who Indicated Engineering Technology as Their Educational Aspiration." A group of 274 of the high school seniors who indicated in the RCU study that they were going

tc major in engineering technology were studied. The objective of the study was to determine what program of study was actually pursued, what understanding was held by the study group of the engineering technology job classification and what counseling had been done to help in the relation.

Mr. Yeager found that "the group had not been meaningfully counseled, did not know the significance of the job classification of engineering technician and did not actually pursue an engineering technology program in a college or university."

The Need for Further Study

Each of the studies reviewed add to the growing understanding of technical education, but there are obvious gaps in the information supplied by these individual reports. There appears a need for continuing synthesis of research in this area along with planning and encouragement of broad long range studies. Some of these studies provide a base of information that could be used for continuing longitudinal study. More investigation is also needed in the area of technical manpower supply and demand data especially with respect to definitions, identification, utilization and relationships to national trends. Additional research relating to refined procedures for determining resource requirements and corresponding returns in technical education should be a worthwile area for investigation.

BIBLIOGRAPHY

POST-HIGH SCHOOL TECHNICAL EDUCATION RESEARCH IN OKLAHOMA

History

David Longobardi, "Historical Development of the Electronics Technology Curriculum at Oklahoma State University's Technical Institute," May 1967.

Robert Freed, "The Development of Post-High School Technical-Vocational Education in Oklahoma," May 1968.

Statewide Survey

Maurice Roney and Paul Braden, "Occupational Education Beyond the High School in Oklahoma," January 1968.

Howard Hardt, "Output of Engineering and Physical Science-Related Technicians from Oklahoma Schools, 1960-1967," July 1968.

Paul Braden, "The Design and Implementation of a State Occupational Training Information System (OTIS) Based on the Needs of Oklahoma."

Placement and Employment

Cecil Dugger, "An Analysis of Oklahoma School-Industry Practices in the Placement and Employment of Technician Graduates," July 1968.

Lloyd Briggs, "A Study of the Placement of Graduates from Oklahoma's Post-High School Programs of Electronic Education," 1965

Wilford Bates, "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma," January 1968.

Cost Benefit

Robert Dupree, "A Cost-Benefit Study of Post-High School Technical Education in Oklahoma," May 1968.

Technical Teachers

Marvin Whittrock, "The Role Perceptions of Oklahoma Technical Teachers Toward Minimum Professional Standards," 1967.

Paul Braden, "Development and Evaluation of a Teacher Education Program in Electro-Mechanical Technology."

Administration

Scott Tuxhorn, "The Educational Unit for Administration, Organization and Supervision of Area Vocational-Technical Schools in Oklahoma," 1967.

Program Development

Maurice Roney, "Development and Evaluation of Education Programs in Electro-Mechanical Technology."

Paul Braden, "Development and Evaluation of a Teacher Education Program in Electro-Mechanical Technology."

Student Characteristics

Wilford M. Bates, "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma," January 1968.

Donald Brown, "The Relationship of Academic Success of Students Enrolled in the Oklahoma State University Technical Institute to Reading Ability and Mechanical Ability," August 1964.

James Harris, "An Analysis of Oklahoma City High School Technical Graduates as Related to Subsequent Higher Education Patterns," July 1968.

Aaron Miller, "A Study of Engineering and Technical Institute Freshmen Enrollees and Dropouts in Terms of Selected Intellective and Non-Intellective Factors," June 1966.

Marsena Norris, "Selected Behavioral Changes of Students Attending the Southern Oklahoma Area Vocational-Technical Center During 1966-67," July 1968.

Oklahoma Research Coordinating Unit, "Future Plans of High School Seniors in Oklahoma," 1967.

Donald S. Phillips, "Personal and Social Background Characteristics of Entering Technician Education Students at Four Post-High School Institutions," January 1968.

Terry Spradley, "The Relationship of Academic Success of Students Enrolled in Business Data Processing at Three Oklahoma Junior Colleges to American College Test Scores (ACT) and Level of Mathematics," July 1968.

Gordon Von Stroh, "A Socio-Economic Study of Vocational-Technical Education Students," 1968.

Dewey Yeager, "A Study of Oklahoma High School Seniors Who Indicated Engineering Technology as Their Educational Aspiration," May 1968.